

# Interprofessional Collaboration Improves the Odds of Educating Patients About PrEP over Time

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**BACKGROUND:** Low levels of pre-exposure prophylaxis (PrEP) uptake continue among the most vulnerable (e.g., men who have sex with men) for HIV exposure in the USA. Providers of social and public health services (“psychosocial providers”) can help improve this situation by educating patients about PrEP before linking them to primary care providers (PCPs).

**OBJECTIVE:** To identify predictors of psychosocial providers offering PrEP education to patients vulnerable to HIV infection by determining the frequency with which psychosocial providers offer PrEP education to patients.

**DESIGN:** Longitudinal overview of PrEP implementation in New York City.

**PARTICIPANTS:** Psychosocial providers of HIV prevention and adjunct treatment services, such as medication adherence counseling in 34 community settings.

**MAIN MEASURES:** Longitudinal survey data collected in 2014–2016 (baseline) and 2015–2017 (1-year follow-up) from a 5-year longitudinal repeated measures study. Logistic regression modeling tested associations between baseline psychosocial provider-level and organization-level characteristics and frequency of PrEP education at baseline and 1-year follow-up.

**KEY RESULTS:** Out of 245 participants, the number of psychosocial providers offering PrEP education at least once in the past 6 months increased significantly from baseline ( $n = 127$ , 51.8%) to 1-year follow-up ( $n = 161$ , 65.7%). Participants with higher odds of offering PrEP education at baseline and at one-year follow-up were more likely to have reported high levels of interprofessional collaboration (IPC) and were also more likely to have received formal HIV prevention training.

**CONCLUSIONS:** Both IPC and HIV training are predictive of PrEP education, and this association was maintained over time. We recommend expanding educational outreach efforts to psychosocial providers to further improve PrEP education and also training in interprofessional collaboration. This is an important first step toward linking patients to PCPs who prescribe PrEP and may help improve PrEP uptake.

**KEY WORDS:** pre-exposure prophylaxis (PrEP); service providers; HIV Continuum of Care; interprofessional collaboration.

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In 2012, the Food and Drug Administration (FDA) approved Truvada™ (emtricitabine/tenofovir disoproxil fumarate (TDF/FTC)) as a pre-exposure prophylaxis (PrEP) strategy shown to reduce risk of HIV acquisition. Clinical trials have demonstrated that PrEP reduces HIV acquisition by 73% among adult men who have sex with men (MSM) and transgender women with a 90% adherence rate,<sup>1</sup> with greater efficacy (up to 99%) for individuals with higher rates of adherence and increased concentrations among serodiscordant heterosexual couples.<sup>2,3</sup> Clinical trials have also demonstrated over 85% efficacy in women with high rates of PrEP adherence.<sup>4</sup> However, low levels of PrEP uptake continue in the USA.<sup>5,6</sup> According to data from the National HIV Behavioral Surveillance, the CDC estimates that just one-quarter of MSM were taking PrEP in 2017, including 19% of African American and 21% of Hispanic/Latinx men, even though 85% of HIV-negative MSM surveyed had heard of PrEP.<sup>7</sup>

In a published systematic review, we identified 30 barriers to PrEP uptake.<sup>8</sup> Two key barriers concern unfavorable attitudes about PrEP,<sup>9,10</sup> and the “purview paradox”—infectious disease specialists who are poised to prescribe PrEP often do not see HIV-negative patients who would benefit from PrEP, while primary care providers (PCPs) who care for uninfected patients are infrequently trained to prescribe PrEP. Because PrEP is a preventive intervention for uninfected individuals, PCPs are thus poised to be the main prescribers of PrEP.<sup>11,12</sup> However, a survey of 525 PCPs and HIV specialists revealed that a quarter (24%) of PCPs had not heard of PrEP. Only 28% of PCPs felt comfortable prescribing PrEP, compared with 76% of HIV specialists.<sup>5</sup>

PrEP-eligible patients—especially women, sex workers, and people who use injection drugs—do not often initiate conversation about PrEP with their doctors.<sup>13</sup> Psychosocial providers (e.g., social workers, health educators, and navigators) can help to improve PrEP uptake by integrating PrEP education into day-to-day practice. The literature suggests that there is a need to assist PCPs to identify appropriate PrEP

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candidates<sup>12</sup>—one strategy may be to train psychosocial providers to offer PrEP education, a precursor to referring at-risk patients to PCPs who can prescribe PrEP. Psychosocial providers, in their pivotal PrEP educator role, may also help to increase PrEP uptake by offering information about PrEP, thereby aiding patients in deciding whether PrEP is right for them and to subsequently seek PrEP services.

The current study conveys a longitudinal overview of PrEP implementation in New York City (NYC), an epicenter of the HIV epidemic. The aim was to identify psychosocial provider- and organization-level predictors of PrEP education and to examine how initial IPC training may affect the provision of PrEP education over time. This study's examination of behaviors in response to PrEP as a new HIV prevention tool in NYC offers a view into how psychosocial providers are responding to HIV prevention innovations that are national and global priorities.

## METHODS

The study was approved by the appropriate Institutional Review Boards. We used longitudinal survey data collected from psychosocial providers in 2014–2016 (baseline) and 2015–2017 (12-month follow-up) from a 5-year longitudinal repeated measure study of 34 community settings in NYC.<sup>14</sup> We adhered to principles of community-engaged research from study conceptualization to data collection, analysis, and dissemination (for details, see Krakower et al.<sup>8</sup>). The study's methods were developed by the Implementation Community Collaborative Board (ICCB), composed of university researchers, providers, managers, and patients. The ICCB was developed using six published steps meant to engage members in both procedural and substantive research roles.<sup>15, 16</sup>

### Procedures

**Organization Recruitment.** We made contact by US mail to organizations with earmarked funding for populations frequently exposed to HIV. The first organizations whose representatives accepted our terms were enrolled. All organizations provided services to both HIV-infected and non-infected patients.

**Psychosocial Provider Recruitment.** Eligible providers (1) offered direct services and linkages to HIV prevention or treatment services; (2) recruit patients for HIV-related prevention or treatment services; and/or (3) deliver HIV prevention or adjunct treatment services (e.g., adherence counseling).

**Data Collection.** Project staff implemented computer-assisted face-to-face interviews, using notebook computers loaded with password-protected survey software powered by DATSTAT Illume 6.0. Psychosocial provider interviews lasted 45–60 min. Organization representatives took a short organizational survey about their organizations (15–20 min).

## Measures

The psychosocial provider survey included 150 questions including the following: (1) job descriptions and demographic information; (2) HIV-related training experience; (3) provision of PrEP education; (4) interprofessional collaboration opinions and experiences; and (5) job satisfaction. Surveys were piloted with six psychosocial providers whose responses were used to help refine questions, modify question order, and ensure clarity. The survey was then re-piloted with six new volunteers, prior to baseline collection.

The organizational survey included 45 questions about the following: (1) organizational capacity; (2) staff preparedness; (3) the organization's prior research experience; (4) their delivery of evidence-based interventions; and (5) their linkage to services.

**Demographics.** Demographic characteristics included *age*, *ethnicity*, *race*, *gender*, and *education*.

**Outcome.** *PrEP education* was measured at baseline and at 12 months post-baseline with the following question: "In the past 6 months, how often have you given information or educated patients about PrEP?" Response options were categorical: *several times per week*; *about once per week*; *about once per month*; *less than once per month*; *nothing in past 6 months*. Participants were given an abbreviated definition of PrEP from the CDC website: "PrEP is a new FDA-approved medication for the prevention of HIV. People who do not have HIV can take a daily pill to reduce their risk of becoming infected." *Education*, as measured in the study, was conceptualized as the psychosocial provider sharing with the patient, at a minimum, the CDC's abbreviated definition.

**Predictors.** *Interprofessional collaboration* (IPC) refers to the collaboration among psychosocial providers and between psychosocial and primary care providers in the NYC diffusion system. We used an abbreviated version of the Bronstein (2002) IPC Index<sup>17</sup>. The abbreviated 30-item scale<sup>18</sup> contains five domains measuring opinions (strongly agree to strongly disagree) regarding IPC: *interdependence* (e.g., "I ask colleagues in other agencies for their expertise"); *newly created professional activities* (e.g., "New programs emerge from collaboration between colleagues from different agencies"); *flexibility* (e.g., "I am willing to take on tasks outside of my job description, when I think it is important"); *collective ownership of goals* (e.g., "My colleagues from other agencies work with me in an effort to resolve conflicts"); and *reflection on process* (e.g., "Colleagues from agencies in my network share information with consumers and students") These five domains were taken as indicators of a single latent variable representing IPC in the structural equation modeling (scale Cronbach alpha = 0.84).

**Formal HIV training** was measured by, "Do you have formal training (curriculum-based training) in HIV prevention? For example, did you study it in college? Do you have any certificates?"

*On-the-job HIV training* was measured by, “When were providers in your organization trained to help patients access HIV services?” This study did not inquire about specific types of programs.

*Work positions* included supervisor, counselor, case manager, navigator, educator/outreach, and program administrator.

*Caseload* was measured with the question, “Please tell us, on average, how many patients you provide services to each week (individually or in groups)?”

*Job satisfaction* was measured with three questions: “How satisfied are you with your (1) job, (2) pay, and (3) working conditions?”

In *organization size and capacity*, organization-level data were collected at both baseline and 12 months and linked to each participant. We used small to large budgets as proxy to size and number of staff as proxy to capacity.

## Statistical Analysis

Descriptive proportions for all measures were summarized across 245 participants. Within-person test of increased frequency of offering PrEP education at 1-year follow-up compared with baseline was assessed using McNemar’s test. We used binary logistic regression modeling to test associations of each demographic and job characteristic with baseline and follow-up PrEP education. Specifically, binary logistic regression (PrEP education: yes/no) was fit for “Ever educating in last 6 months” and “Educated at least weekly in the last 6 months, at baseline, and at follow-up.” We provide odds ratios and adjusted odds ratios as measures of effects with 95% confidence intervals indicating statistical significance at the 0.05 level. We also conducted a trend test to assess whether higher IPC was associated with higher odds of providing PrEP education. A random effects logistic regression model with random intercept for the 34 organizations was fit to account for clustering at the organizational level, but the variance component provided no better fit (according to the BIC) than a model with it fixed at zero, hence the random intercept was not included.

## RESULTS

### Organization and Sample Characteristics

Fourteen (41%) of the organizations had annual budgets below 1 million. An additional 41% of the organizations had between 25 and 100 psychosocial providers. Within the 34 organizations, the average number of providers per organization was 7.2 (standard deviation = 3.8). The number of providers per organization ranged from 1 to 15. The median number of providers was 6.5, with an interquartile range of 4–10.

Table 1 shows that most participants were women (64%); Black or African American (54%); not Hispanic or Latino (65%). The average age was 43 (standard deviation (SD) = 12), and the majority (77%) had at least some college (i.e.,

**Table 1 Baseline Demographic and Job Characteristics for Longitudinal Survey (N = 245)**

Variables at baseline	n	%
<b>Age</b> (Mean = 43.0, SD = 11.8)		
1. 20–29	33	13.47
2. 30–39	77	31.43
3. 40–49	55	22.45
4. ≥ 50	80	32.65
<b>Gender</b>		
Male	88	35.92
Female	157	64.08
<b>Race</b>		
White	64	26.12
Black or African American	133	54.29
Native Hawaiian, Asian, American Indian, Alaskan	12	4.9
Native		
More than one race	36	14.69
<b>Ethnicity</b>		
Not Hispanic or Latino	160	65.31
Hispanic or Latino	85	34.69
<b>Education</b>		
Less than high school	2	0.82
High school diploma/GED	55	22.45
Associate’s degree	23	9.39
Bachelor’s degree	77	31.43
Master’s degree	86	35.10
Doctoral degree	2	0.82
<b>Work position</b>		
Case manager	47	19.18
Counselor	42	17.14
Supervisor	62	25.31
Care/patient navigator	12	4.9
Educator/outreach	36	14.69
Program admin	32	13.06
Other	14	5.71
<b>Caseload per week</b>		
Fewer than 30 clients	139	56.73
31–50 clients	65	26.53
More than 50 clients	41	16.73
<b>Interprofessional collaboration</b>		
Low	59	24.08
Low-middle	63	25.71
Middle-high	62	25.31
High	61	24.9
<b>Formal HIV training</b>		
None	92	37.55
Yes	153	62.45
<b>On-the-job HIV training</b>		
Never	33	13.47
> 2 years ago	105	42.86
Within the past 0–2 years	107	43.67
<b>Job satisfaction</b>		
Dissatisfied	23	9.39
Satisfied	222	90.61
<b>Pay satisfaction</b>		
Dissatisfied	83	33.88
Satisfied	162	66.12
<b>Working conditions</b>		
Dissatisfied	34	13.88
Satisfied	211	86.12
<b>Organization size<sup>a</sup></b>		
< \$1M	11	4.49
\$1M–\$5M	93	37.96
\$5M–\$10M	41	16.73
More than \$10M	100	40.82
<b>Organization capacity<sup>a</sup></b>		
< 25	79	32.24
25–50	42	17.14
51–100	67	27.35
More than 100	57	23.27

<sup>a</sup>Values shown represent number of providers across the 34 organizations

associate degrees or higher). One-quarter of the sample held supervisory positions, and caseloads were typically fewer than



30 patients per week. Most participants reported satisfaction with their job ( $n = 222$ ; 91%); pay ( $n = 162$ ; 66%); and working conditions ( $n = 211$ ; 86%). Sixty-two percent of participants had received formal HIV prevention training at some point, and 44% ( $n = 107$ ) received on-the-job HIV training within the past 2 years. There was heterogeneity in HIV training and IPC among providers from the same organization. Among the organizations, the standard deviation of IPC within each organization ranged from 0.19 to 1.17 at baseline. The median proportion of participants within each organization with formal HIV training was 67%, with interquartile range of 43 to 83%.

### Offering PrEP Education

Table 2 shows that the number of participants offering PrEP education at least once in the past 6 months increased significantly ( $p < 0.0001$ ) from baseline ( $n = 127$ , 51.8%) to 1-year follow-up ( $n = 161$ , 65.7%). The number of participants who offered education at least once per week stayed similar ( $p = 0.439$ ) from baseline ( $n = 66$ , 26.9%) to follow-up ( $n = 72$ , 29.4%). Table 2 also shows that nearly half ( $n = 114$ ; 46.5%) of participants offered PrEP education at both time points; 47 (19.2%) reported not offering PrEP education at baseline but began to do so at follow-up; a small number (13; 5.3%) stopped offering education at follow-up.

### Correlates of Offering PrEP Education at Baseline

Table 3 presents the factors associated with higher odds of ever having offered PrEP education within the last 6 months: male gender (compared with women: odds ratio [OR] = 0.55, 95% CI = 0.32–0.93), formal HIV prevention training (OR = 3.87, 95% CI = 2.23–6.71), and on-the-job HIV training (0–2 years ago: OR = 9.26, 95% CI = 3.04–28.17; > 2 years ago: OR = 10.87, 95% CI = 3.56–33.19). Participants reporting the highest levels of IPC had over 2.5 times the odds of offering

PrEP education compared with those with the lowest levels of IPC (OR = 2.59, 95% CI = 1.24–5.42), and, when using a trend line, higher IPC was significantly associated with higher odds of providing PrEP education in both unadjusted and adjusted analyses.

Sixty-six participants reported offering PrEP education at least once per week in the previous 6 months (Table 2). As shown in Table 3, those with higher frequency of offering PrEP education included male gender (women: OR = 0.37, 95% CI = 0.21–0.67), formal HIV training (OR = 3.64, 95% CI = 1.82–7.26), and on-the-job HIV training within the past 2 years (OR = 13.65, 95% CI = 1.79–104.26) and over 2 years ago (OR = 14.67, 95% CI = 1.92–111.96), as compared with participants who never received HIV training at their agency. Those reporting the highest levels of IPC had over four times the odds of offering PrEP education compared with those with the lowest levels of IPC (OR = 4.13, 95% CI = 1.72–9.87) and, when adjusting for covariates, participants reporting the highest levels of IPC were over five times more likely to provide PrEP education compared with participants reporting the lowest levels of IPC (AOR = 5.32, 95% CI = 1.63–17.36). Similarly, when using a trend line, higher IPC was associated with higher odds of providing PrEP education in unadjusted and adjusted analyses (with statistical significance reached in unadjusted analysis).

### Prospective Predictors of Offering PrEP Education at Follow-up

Table 4 shows baseline factors associated with offering PrEP education at 12-months follow-up. Participants with higher odds of offering PrEP education at follow-up included Hispanic/Latino (OR = 1.98, 95% CI = 1.1–3.56) and those with supervisory roles (as compared with case managers) (OR = 2.32, 95% CI = 1.02–5.27). In addition, participants who received formal HIV prevention training had higher odds of providing PrEP education than those who had not received training (OR = 3.03, 95% CI = 1.75–5.24), and participants who received on-the-job HIV training within past 2 years (OR = 6.84, 95% CI = 2.85–16.41) or over 2 years ago (OR = 6.67, 95% CI = 2.78–16.00) had higher odds of offering PrEP education than psychosocial providers who never received on-the-job HIV training.

IPC also showed a positive relationship with PrEP education: compared with participants with lower IPC, those with medium-high (OR = 2.23, 95% CI = 1.05–4.76) or high (OR = 2.37, 95% CI = 1.1–5.11) levels had higher odds of offering PrEP education. Similarly, in adjusted results, higher IPC was associated with higher odds of providing PrEP education when using a trend line, and medium-high IPC was significantly associated with higher odds of providing PrEP education as compared with lower IPC (AOR = 3.64, 95% CI = 1.31–10.11). Organization-level factors associated with PrEP education included working at an organization with over 100 employees (compared with < 25) (OR = 0.41, 95% CI = 0.19–

**Table 2 Frequency of PrEP Education by Providers of Social and Public Health Services at Two Time Points ( $n = 245$ )**

“In the past 6 months, how often have you given information or educated patients about PrEP?”	Baseline 2014–2016		Follow-up 2015–2017	
	<i>n</i>	%	<i>n</i>	%
Response options				
Several times per week	41	16.7	49	20.0
Once per week	25	10.2	23	9.4
About once per month	26	10.6	46	18.8
Less than once a month	35	14.3	43	17.6
Have not educated	118	48.2	84	34.3 <sup>a</sup>
Aggregating response options				
At least once in past 6 months	127	51.8	161	65.7 <sup>a</sup>
At least once per week	66	26.9	72	29.4 <sup>b</sup>

<sup>a</sup>McNemar’s trend test: Statistically significant increase  $p < 0.0001$  in percent for at least once in past 6 months

<sup>b</sup>McNemar’s trend test: non-significant increase in percent for at least once per week,  $p = 0.439$

Table 3 Correlates of Providing PrEP Education at Baseline (N = 245)

Variable	Ever in last 6 months						At least once per week in last 6 months					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
	% PrEP	OR	CI	AOR	CI	AOR	CI	% PrEP	OR	CI	AOR	CI
<b>Age category</b>												
20-29	54.55	ref		ref		ref		33.33	ref		ref	
30-39	57.14	1.11	(0.49-2.52)	1.86	(0.61-5.73)	1.86	(0.61-5.73)	32.47	0.96	(0.40-2.29)	1.03	(0.30-3.51)
40-49	52.73	0.93	(0.39-2.21)	0.74	(0.61-5.73)	0.74	(0.61-5.73)	20	0.50	(0.19-1.33)	0.23	(0.07-0.84)
≥50	45	0.68	(0.30-1.54)	0.49	(0.61-5.73)	0.49	(0.61-5.73)	23.75	0.62	(0.26-1.51)	0.34	(0.10-1.12)
<b>Gender</b>												
Male	61.36	ref		ref		ref		39.77	ref		ref	
Female	46.5	0.55	(0.32-0.93)	0.44	0.90	0.44	0.90	19.75	0.37	(0.21-0.67)	0.28	(0.13-0.62)
<b>Race</b>												
White	51.56	ref		ref		ref		28.13	ref		ref	
Black or African American	50.38	0.95	(0.53-1.73)	1.04	(0.45-2.43)	1.04	(0.45-2.43)	27.07	0.95	(0.49-1.85)	0.94	(0.35-2.48)
Native Hawaiian, Asian, American, Indian, More than one race	56.25	1.21	(0.57-2.56)	1.00	(0.37-2.65)	1.00	(0.37-2.65)	25	0.85	(0.36-1.99)	0.477	(0.16-1.47)
<b>Ethnicity</b>												
Non-Hispanic	48.75	ref		ref		ref		23.13	ref		ref	
Hispanic	57.65	1.43	(0.84-2.43)	1.16	(0.53-2.52)	1.16	(0.53-2.52)	34.12	1.72	(0.96-3.07)	1.801	(0.72-4.50)
<b>Education</b>												
HS or less	52.63	ref		ref		ref		31.58	ref		ref	
Associate's or higher	51.6	0.96	(0.53-1.74)	1.04	(0.44-2.48)	1.04	(0.44-2.48)	25.53	0.74	(0.39-1.42)	0.672	(0.25-1.78)
<b>Formal training</b>												
None	31.52	ref		ref		ref		13.04	ref		ref	
Yes	64.05	3.87	(2.23-6.71)	5.22	(2.58-10.56)	5.22	(2.58-10.56)	35.29	3.64	(1.82-7.26)	3.74	(1.51-9.25)
<b>On-the-job HIV training</b>												
Never	12.12	ref		ref		ref		3.03	ref		ref	
> 2 years	60	10.87	(3.56-33.19)	19.36	(4.69-80.10)	19.36	(4.69-80.10)	31.43	14.67	(1.92-111.96)	23.20	(2.43-221.65)
0-2 years	56.07	9.26	(3.04-28.17)	28.54	(28.5-123.26)	28.54	(28.5-123.26)	29.91	13.65	(1.79-104.26)	26.90	(2.77-261.49)
<b>Work position</b>												
Case manager	46.81	ref		ref		ref		25.53	ref		ref	
Counselor	47.62	1.03	(0.45-2.38)	0.54	(0.18-1.60)	0.54	(0.18-1.60)	19.05	0.69	(0.25-1.89)	0.34	(0.09-1.26)
Supervisor	59.68	1.68	(0.78-3.62)	1.12	(0.40-3.07)	1.12	(0.40-3.07)	33.87	1.49	(0.64-3.46)	1.16	(0.38-3.51)
Navigator	66.67	2.27	(0.60-8.59)	0.82	(0.15-4.49)	0.82	(0.15-4.49)	41.67	2.08	(0.56-7.81)	0.71	(0.13-3.84)
Educator/outreach	55.56	1.42	(0.59-3.40)	0.76	(0.24-2.44)	0.76	(0.24-2.44)	33.33	1.46	(0.56-3.79)	0.72	(0.20-2.57)
Program admin	40.63	0.78	(0.31-1.93)	0.50	(0.16-1.63)	0.50	(0.16-1.63)	9.38	0.3	(0.08-1.17)	0.13	(0.03-0.72)
Other	50	1.14	(0.34-3.75)	1.02	(0.21-4.90)	1.02	(0.21-4.90)	35.71	1.62	(0.45-5.80)	1.57	(0.25-9.68)
<b>Caseload per week</b>												
Less than 30 clients	48.92	ref		ref		ref		29.5	ref		ref	
31-50	58.46	1.47	(0.81-2.66)	2.14	0.98-4.66	2.14	0.98-4.66	24.62	0.78	(0.40-1.53)	0.869	(0.36-2.11)
More than 50	51.22	1.1	(0.55-2.20)	1.35	1.35-3.39	1.35	1.35-3.39	21.95	0.67	(0.29-1.53)	0.59	(0.20-1.72)
<b>Interprofessional collaboration (IPC)</b>												
Low	42.37	ref		ref		ref		15.25	ref		ref	
Low-medium	47.62	1.24	(0.6-2.53)	1.18	(0.48-2.89)	1.18	(0.48-2.89)	23.81	1.74	(0.69-4.34)	2.43	(0.77-7.73)
Medium-high	51.61	1.45	(0.71-2.97)	1.67	(0.65-4.28)	1.67	(0.65-4.28)	25.81	1.93	(0.78-4.8)	3.10	(0.94-10.18)
High	65.57	2.59	(1.24-5.42)	2.34	(0.89-6.15)	2.34	(0.89-6.15)	42.62	4.13	(1.72-9.87)	5.32	(1.63-17.36)
IPC trend	<i>p = 0.01</i>							<i>p = 0.001</i>				
<b>Job satisfaction</b>												
Dissatisfied	39.13	ref		ref		ref		8.70	ref		ref	
Satisfied	53.15	1.76	(0.73-4.25)	3.17	(0.93-10.78)	3.17	(0.93-10.78)	28.83	4.25	(0.97-18.67)	5.24	(0.82-33.42)
<b>Pay satisfaction</b>												

(continued on next page)

Table 3. (continued)

Variable	Ever in last 6 months				At least once per week in last 6 months				
	Unadjusted		Adjusted		Unadjusted		Adjusted		
	% PrEP	OR	CI	AOR	CI	OR	CI	AOR	CI
Dissatisfied	53.01	ref		ref		25.3		ref	
Satisfied	51.23	0.93	(0.55–1.58)	1.08	(0.51–2.28)	27.78		1.14	(0.62–2.07)
<b>Satisfaction with working conditions</b>									
Dissatisfied	61.76	ref		ref		20.59		ref	
Satisfied	50.24	0.62	(0.3–1.31)	0.36	(0.12–1.07)	27.96		1.50	(0.62–3.62)
<b>Agency budget</b>									
<\$1M	36.36	ref		ref		27.27		ref	
\$1M–\$5M	56.99	2.32	(0.63–8.47)	3.79	(0.65–22.03)	31.18		1.21	(0.30–4.89)
\$5M–\$10M	63.41	3.03	(0.76–12.09)	7.54	(1.00–56.6)	34.15		1.38	(0.32–6.05)
More than \$10M	44	1.37	(0.38–5.00)	10.02	(1.12–89.87)	20		0.67	(0.16–2.74)
<b>Agency capacity</b>									
<25	58.23	ref		ref		34.18		ref	
25–50	47.62	0.65	(0.31–1.38)	0.34	(0.09–1.31)	19.05		0.45	(0.18–1.11)
51–100	53.73	0.83	(0.43–1.61)	0.66	(0.24–1.86)	28.36		0.76	(0.38–1.54)
More than 100	43.86	0.56	(0.28–1.12)	0.15	(0.03–0.73)	21.05		0.51	(0.23–1.13)

0.85) with a budget of \$1M–\$5M compared with <\$1M (OR = 3.87, 95% CI = 1.08–13.92).

DISCUSSION

Our findings illustrate that not only is interprofessional collaboration (IPC) predictive of participants offering PrEP education to clients but also that this association is maintained over time. Furthermore, as the degree of IPC increases, so does the frequency with which psychosocial providers educate patients about PrEP. A possible reason for this positive correlation is that psychosocial providers who frequently collaborate with other organizations may be exposed to more educational and training resources, and thereby they may benefit from a shared knowledge base that they extend to patients. Alternatively, psychosocial providers may be influenced by and then follow practice norms, such as offering PrEP education, which are often set by organizations in the same collaborative network. Participants who had received formal HIV training were more likely to offer PrEP education at both baseline and follow-up, regardless of when that training was received. This suggests that organizations can improve PrEP education by offering psychosocial providers the training they need to develop the knowledge and skills needed to both engage in IPC and PrEP education. Future research is recommended to uncover the best pedagogy for combining knowledge and skills in the areas of both IPC and PrEP education.

We found that more men than women offered PrEP education to their patients at baseline (61.4% of men vs. 46.5% of women reported providing PrEP education in the past 6 months), but this initial 14.9% difference decreased to just 4% at 12-month follow-up. This was due to a 17.8% increase in provision of PrEP education among women. Since PrEP is widely recommended for men who have sex with men,<sup>19</sup> this initial sizable disparity in PrEP education between men and women psychosocial providers may be reflective of provider/patient congruent gender identity. Yet, since women’s psychosocial providers made such rapid gains in educating their patients about PrEP in just a 12-month period, gender-based differences may continue to decrease as PrEP use becomes more widespread.

None of the variables related to job characteristics (e.g., caseload, position) or organizational context (e.g., budget, and number of employees) was significantly associated with PrEP education at baseline. However, at follow-up, budget, size, and work positions were predictive of PrEP education. Since the study began in 2012, the same year that PrEP was approved by the FDA, we expected that as PrEP-related knowledge and availability increased, PrEP education frequency would also increase. Our findings support this hypothesis. At baseline, when knowledge and resources related to PrEP were scantier, provider-level characteristics were more salient than organization-level characteristics. Yet, by follow-up, more resourceful organizations had greater abilities to train

Table 4 Prospective Correlates of Providing PrEP Education 12 Months after Baseline (N = 245)

Baseline					
Variable	%PrEP	Unadjusted		Adjusted	
		OR	CI	AOR	CI
<b>Age category</b>					
20–29	69.7	ref			
30–39	67.53	0.9	(0.37–2.19)	1.34	(0.43–4.18)
40–49	63.64	0.76	(0.30–1.92)	0.66	(0.21–2.04)
≥ 50	63.75	0.76	(0.32–1.83)	0.69	(0.23–2.10)
<b>Gender</b>					
Male	68.18	ref			
Female	64.33	0.84	(0.48–1.47)	0.81	(0.39–1.67)
<b>Race</b>					
White	70.31	ref			
Black or African American	63.16	0.72	(0.38–1.37)	1.07	(0.44–2.64)
Native Hawaiian, Asian, American, Indian, more than one race	66.67	0.84	(0.38–1.89)	0.62	(0.22–1.74)
<b>Ethnicity</b>					
Non-Hispanic	60.63	ref		ref	
Hispanic	75.29	1.98	(1.10–3.56)	2.38	(1.00–5.65)
<b>Education</b>					
HS or less	59.65	ref			
Associate's or higher	67.55	1.41	(0.76–2.59)	1.75	(0.71–4.36)
<b>Formal HIV prevention training</b>					
None	50	ref		ref	
Yes	75.16	3.03	(1.75–5.24)	2.92	(1.48–5.77)
<b>Time of HIV/primary care training</b>					
Never	27.27	ref		ref	
> 2 years	71.43	6.67	(2.78–16.00)	9.22	(2.98–28.50)
0–2 years	71.96	6.84	(2.85–16.41)	9.78	(3.14–30.41)
<b>Work position</b>					
Case manager	57.45	ref		ref	
Counselor	64.29	1.33	(0.57–3.14)	1.02	(0.33–3.15)
Supervisor	75.81	2.32	(1.02–5.27)	2.17	(0.73–6.47)
Navigator	100	N/A	N/A	N/A	N/A
Educator/outreach	66.67	1.48	(0.6–3.65)	1.19	(0.37–3.88)
Program admin	56.25	0.95	(0.38–2.36)	0.79	(0.24–2.57)
Other	42.86	0.56	(0.17–1.86)	0.63	(0.14–2.90)
<b>Caseload per week</b>					
Less than 30 clients	67.63	ref		ref	
31–50	66.15	0.94	(0.5–1.75)	1.00	(0.44–2.27)
More than 50	58.54	0.68	(0.33–1.38)	0.92	(0.35–2.38)
<b>Interprofessional collaboration (IPC)</b>					
Low	54.24	ref		ref	
Low-medium	61.9	1.37	(0.67–2.82)	1.42	(0.57–3.53)
Medium-high	72.58	2.23	(1.05–4.76)	3.64	(1.31–10.11)
High	73.77	2.37	(1.10–5.11)	1.86	(0.72–4.82)
IPC trend		<i>p</i> = 0.01		<i>p</i> = 0.07	
<b>Job satisfaction</b>					
Dissatisfied	56.52	ref		ref	
Satisfied	66.67	1.54	(0.64–3.67)	3.78	(1.10–14.18)
<b>Pay satisfaction</b>					
Dissatisfied	69.88	ref		ref	
Satisfied	63.58	0.75	(0.43–1.33)	0.70	(0.32–1.53)
<b>Satisfaction with working conditions</b>					
Dissatisfied	76.47	ref		ref	
Satisfied	63.98	0.55	(0.24–1.27)	0.38	(0.11–1.23)
<b>Agency budget</b>					
< \$1M	45.45	ref		ref	
\$1M–\$5M	76.34	3.87	(1.08–13.92)	5.32	(0.91–31.10)
\$5M–\$10M	70.73	2.90	(0.74–11.35)	5.60	(0.75–41.65)
More than \$10M	56	1.53	(0.44–5.33)	6.81	(0.81–57.45)
<b>Agency capacity</b>					
< 25	75.95	ref		ref	
25–50	61.9	0.51	(0.23–1.16)	0.46	(0.12–1.82)
51–100	64.18	0.57	(0.28–1.16)	0.61	(0.20–1.84)
More than 100	56.14	0.41	(0.19–0.85)	0.29	(0.06–1.33)

psychosocial providers in PrEP-related knowledge which then may have influenced PrEP education frequency.

To increase PrEP uptake among individuals at risk for HIV infection, we recommend expanding PrEP education. PrEP

education received from psychosocial providers may be the first time patients hear about PrEP. This constitutes a valuable first line of defense against HIV infection. We also recommend that psychosocial providers become advocates for HIV



prevention training that includes knowledge about PrEP. Shared knowledge and norms within organizations may positively impact HIV prevention—as shown by this study, IPC between psychosocial providers across multiple organizations made a significant impact on PrEP education.

## Limitations

Our analysis is limited to psychosocial providers and organizations in NYC, so our findings may not be generalizable outside of this urban context. However, we believe that the diversity of provider- and organizational-level characteristics included in our sample increases the scope of the findings. Psychosocial provider data was self-reported, and, as with all self-reported measures, this carries a risk of bias. We recognize that some strong associations may have been due to social desirability where participants may have endorsed all behaviors that are expected of them (e.g., IPC). Reverse causation may have occurred – providers receiving formal PrEP education may be more likely to be also receiving formal HIV training and engaging in IPC. However, this is somewhat mitigated by the fact that we look at prospective associations. Nonetheless, it could be true at baseline that PrEP programs actually increased IPC and training. We did not include patient-level feedback, and we are thus unable to triangulate provider and patient data.

## CONCLUSIONS

Psychosocial providers are expertly poised to educate patients about PrEP and to refer them to PCPs who can prescribe PrEP. Since IPC among psychosocial providers is associated with increased provision of PrEP education to patients, agencies should provide opportunities for psychosocial providers to collaborate with other healthcare workers in order to provide PrEP-eligible patients with a comprehensive array of resources.

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